

**California Regional Water Quality Control Board  
Santa Ana Region**

**March 3, 2006**

**Item:**

**Subject: Public Hearing: Consideration of Adoption of Proposed Basin Plan Amendment – Incorporation of Dry Season Total Maximum Daily Loads for Nutrients for Big Bear Lake – Resolution No. R8-2006-0023**

**DISCUSSION**

On June 21, 2005, staff of the California Regional Water Quality Control Board, Santa Ana Region (Regional Board) issued a staff report entitled “Nutrient TMDLs for Big Bear Lake”. The report recommended that the Regional Board consider amendment of the Implementation Plan of the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) to incorporate the proposed TMDLs, which focus on dry hydrologic conditions. TMDLs that address average and wet hydrologic conditions are to be developed in the future.

On August 26, 2005, the Regional Board held a public workshop to receive evidence and testimony on the proposed Big Bear Lake Total Maximum Daily Loads (TMDLs). Staff revised the proposed TMDLs based on both written and oral comments received from the public, and responded to comments received prior to, during and after the August 26, 2005 public workshop. The revised proposed Basin Plan Amendment is shown in Attachment A (Attachment to Tentative Resolution No. R8-2006-0023). The staff responses to comments received during and after the August 26, 2005 public workshop are included in Attachment B. Attachment C contains the CEQA checklist. Copies of the written comments are included in Attachment D.

Attachment B includes comments received from Dr. Kenneth Reckhow, who provided the requisite scientific peer review. It should be noted that Dr. Reckhow found no significant flaws in the technical approach used to develop the proposed TMDLs (see Comments 201-208).

In summary, the proposed TMDLs include:

- Final numeric targets;
- Wasteload Allocations (WLAs) for point source discharges and Load Allocations (LAs) for nonpoint source discharges;
- An Implementation plan and schedules for compliance with the TMDLs, numeric targets, WLAs and LAs; and,
- A monitoring plan and schedule to assess the effectiveness of the TMDLs.

Based on the comments received on the proposed nutrient TMDLs (as presented on August 26, 2005), staff proposes the following major changes to the TMDLs/Basin Plan Amendment.

**1. Replacement of the final numeric target for total phosphorus with the interim target and appropriate modification of the final phosphorus TMDLs, WLAs, and LAs**

In the June 2005 TMDL Report, staff originally proposed a total phosphorus final numeric target based on the Trophic State Index. An interim target for phosphorus was also recommended. Based on comments received regarding the inappropriateness of the Trophic State Index for Big Bear Lake (see Attachment B, Comments #34, 39, 67, 74, and 202), staff proposes to replace the final total phosphorus target with the interim total phosphorus target. The final total phosphorus target proposed for Big Bear Lake would become 35 µg/L (the final target proposed originally was 20 µg/L). The revised target is shown in Table 5-9a-c in Attachment A.

To be consistent with the recommended change to the final numeric target, the interim TMDLs, WLAs and LAs that had been proposed would become the final TMDLs, WLAs and LAs. The revised TMDLs for nutrients are shown in Table 5-9a-d in Attachment A.

In addition, staff proposes that the numeric targets be established to address all hydrologic conditions, not just dry hydrologic conditions (see Attachment A, Section 1.A.). Again, the TMDLs now proposed are intended to achieve the numeric targets during dry hydrologic conditions. TMDLs to meet the targets under average and wet hydrologic conditions will need to be developed and implemented in the future.

**2. Revision to the interim target for chlorophyll a and replacement of the final numeric target for chlorophyll a with the revised interim target**

In the June 2005 TMDL Report, staff originally proposed a chlorophyll a interim target of 10 ug/L. This interim target was based on the 25<sup>th</sup> percentile of growing season chlorophyll a data from the 4 lake stations and was intended to ensure that algae growth did not become excessive as a result of nutrient concentrations. Comments were received (Attachment B, Comments #33, 34, and 36) suggesting that since algae growth has not been excessive in Big Bear Lake under prevailing lake conditions, it would be more appropriate to set the chlorophyll a target at the ambient lake-wide concentration. Staff agrees and proposes to replace the chlorophyll a target of 10 ug/L with a revised chlorophyll a target of 14 ug/L. This concentration is the median of results from samples collected at the four lake stations from June 2001-October 2001. This time period includes the growing season and was prior to any herbicide application.

In the June 2005 TMDL Report, staff also proposed a final chlorophyll a numeric target of 5.0 ug/L based on the Trophic State Index. Based on comments received regarding the inappropriateness of the Trophic State Index for Big Bear Lake (see Attachment B, Comments #34, 39, 67, 74, and 202), staff proposes to replace the final chlorophyll a target with the revised interim chlorophyll a target. The final chlorophyll a target proposed for Big Bear Lake is 14 µg/L. The revised target is shown in Table 5-9a-c in Attachment A

**3. Revisions to compliance dates for the numeric targets**

Based on comments received (Attachment B, Comments #39, 67, 94 and 140), staff proposes to modify the compliance dates for the proposed numeric targets. In the June 2005 TMDL Report, staff originally proposed 2010 and 2015 as the dates for compliance with the interim and final numeric targets, respectively. Staff now proposes that under dry hydrologic conditions, compliance with the final numeric targets, and with the proposed dry hydrological condition TMDLs, WLAs and LAs, be achieved as soon as possible but no later

than December 31, 2015. The proposed compliance date for the numeric targets under average and wet hydrologic conditions is December 31, 2020. The revised compliance dates for the revised targets are shown in Table 5-9a-c in Attachment A.

**4. Addition of a Lake Management Plan – Task 6**

Staff recommends that a number of tasks that had been identified separately in the implementation plan proposed initially be integrated in a new requirement for the development of a comprehensive lake management plan. Specifically, staff recommends deleting separate implementation tasks for model updates, in-lake sediment nutrient reductions and management of aquatic plants (proposed in Section E (now Section 1.B.4) TMDL Implementation, Tasks 6, 7, and 8) and instead incorporating these tasks in a new Task 6 - Development of a Lake Management Plan. The new task is shown in Table 5-9a-f and described in the accompanying text in Attachment A.

**5. Addition of biocriteria**

Comments were received concerning the need to develop biocriteria for Big Bear Lake (Attachment B, Comments 39 and 64). It was suggested that the development of biocriteria for Big Bear Lake should be included in the TMDL implementation plan. It was also suggested that biocriteria should be developed by the Regional Board (Attachment B, Comment #116). Staff agrees and recommends a revision to former Task 10 (now Task 7) to include the development of biocriteria. Staff also recommends that language be added to the new Task 6 (Development of Lake Management Plan) that would require the stakeholders to include a proposed plan and schedule for the participation of the stakeholders in the Regional Board's effort to develop biocriteria for Big Bear Lake. The revised task is shown in Table 5-9a-f and described in the accompanying text in Attachment A.

**6. Monitoring Program Requirements – Flexibility Language Added**

Comments were received from the City of Big Bear Lake on the monitoring program requirements proposed in Task 4.1 of the implementation plan. The City believes that more specific information on the proposed location of monitoring stations and the proposed frequency of monitoring should be provided (Attachment B, Comments #21, 24 and 25). In response to those comments, staff proposes that language be added to the monitoring program requirements in Task 4 that acknowledges that changes to the proposed monitoring stations, frequencies, or constituents monitored will be considered at any time based on a request from the stakeholders, accompanied by a report that describes the rationale for the proposed changes and identifies recommended alternatives.

**7. Monitoring Program Requirements –Constituents Added**

Based on comments (Attachment B, Comments #6, 7, 20, 31, 41, 68, 79, 86, 87, 100 and 128) that the particulate nutrient loads from sediment should be addressed more thoroughly as well as sediments in general, staff proposes to add the following constituents to be monitored: total nitrogen in sediment, total phosphorus in sediment, bedload concentration, grain size. Staff recommends replacing total suspended solids with suspended sediment concentration. The revised constituent list is shown in Task 4.1 in Attachment A.

**8. Revision to the Compliance Date for Task 7**

Since additional tasks were added to Task 7 (formerly Task 10), staff believes that the compliance date of December 31, 2010 originally proposed is not adequate to allow the completion of the additional tasks. The compliance date now proposed is December 31, 2015.

**9. Development of TMDLs for Wet and/or Average Hydrological Conditions – language added**

The San Bernardino National Forest (Attachment B, Comment # 117) suggested that completion of the development of nutrient TMDLs for wet and/or average hydrological conditions by 2012 might be problematic if these conditions do not occur and appropriate data cannot be collected (proposed in Section B. TMDL Implementation). Staff agrees and recommends adding language reflecting the fact that development of TMDLs for wet and/or average hydrological conditions is contingent upon obtaining the needed data (new Task 9 (formerly Task 12) of the proposed implementation plan).

**8. Addition of a Definition for Natural Background or Minimally-Impacted Areas**

Numerous comments (Attachment B, Comments # 6, 20, 31, 36, 40, 61, 64, 68, 75, 86, 87, 93, 100, 121, 122, 128, 131, 149, 151, 152, 154, 160, 166, 170 and 182) suggested that the Big Bear Lake watershed is natural and that the Regional Board should take into consideration the natural loads from the watershed and the natural loads from the lake bottom sediments. Staff believes that consideration of nutrient loads that arise from natural conditions should be evaluated in the Big Bear Lake watershed; however, staff also believes that how natural is defined is an important consideration. For these reasons, staff proposes to add the Development of Natural Background Definition as part of the Review/Revisions of Big Bear Lake Water Quality Standards (Task 7.3 to the new Task 7 (formerly Task 10)). Staff believes that the effort to review/revise beneficial uses, numeric nutrient water quality objectives or to develop biocriteria should be closely coordinated with the development of a natural background definition, as shown in Task 7 of Attachment A.

In an effort to evaluate natural background or minimally-impacted areas, staff evaluated data and land use information for the watershed.

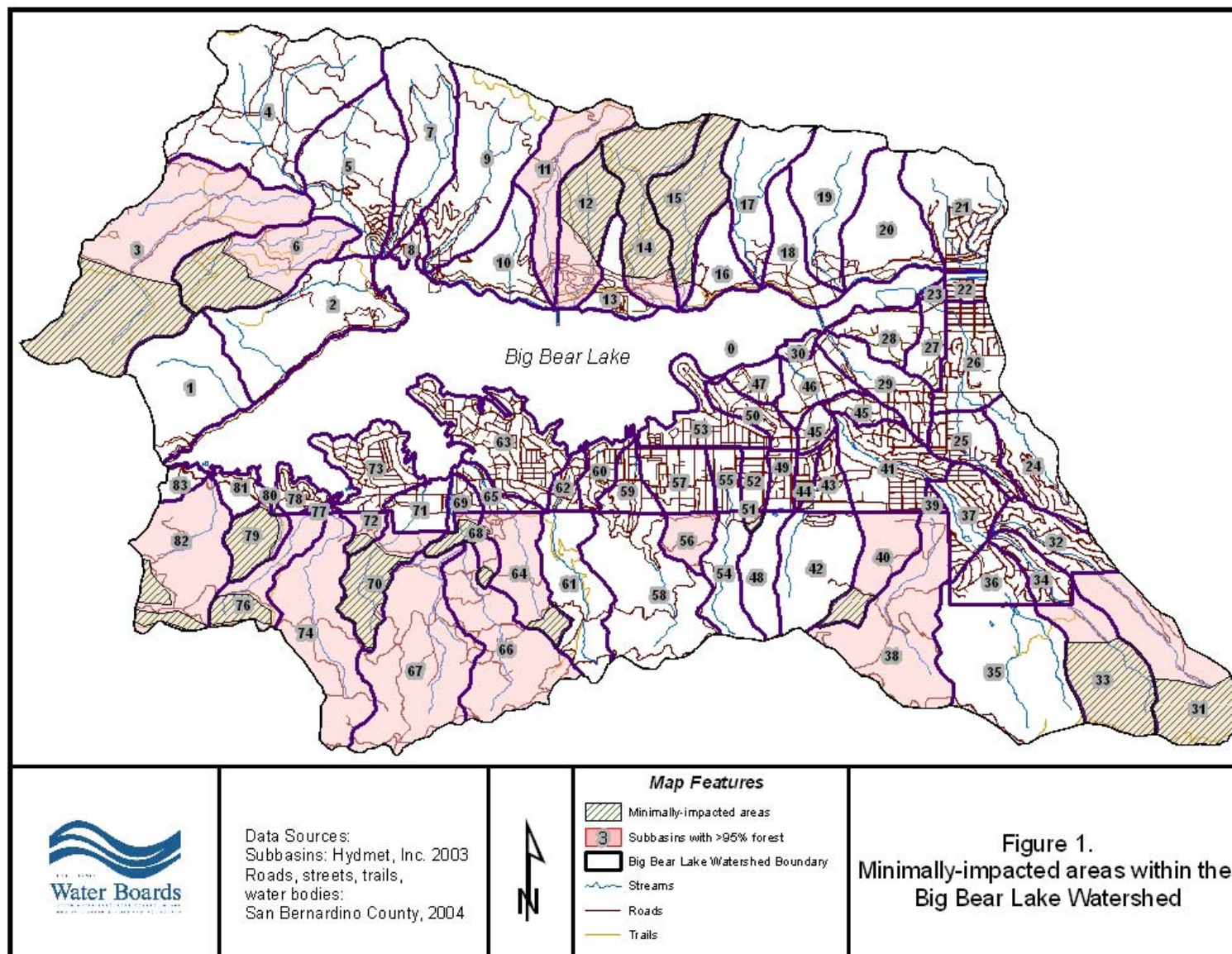
The Southern California Coastal Water Research Project (SCCWRP) is currently undertaking studies to evaluate water quality levels from natural watersheds. To define 'natural watersheds' for the study, one of SCCWRP's criteria was that the watershed had to be at least 95% undeveloped and in as close to pristine condition as possible. Using this criterion, staff re-evaluated the land use in the watershed based on the 83 subbasins as defined in the HSPF water quality simulation model used to develop the proposed TMDL. The goal of this evaluation was to determine how much of each subbasin, and the Big Bear Lake watershed as a whole, could be classified as minimally-impacted.

Of the 83 subbasins defined in the HSPF watershed model, 22 had at least 95% forest land use (Table 1). Those subbasins included: 3, 6, 11, 12, 14, 15, 31, 33, 38, 40, 51, 56, 64, 66, 67, 68, 70, 72, 74, 76, 79, and 82. Total forest land use in the Big Bear Lake watershed equals 14,463 acres (note: this area does not exactly equal that reported in the staff reports due to slight differences in the Geographical Information System (GIS) layers used for this analysis). Of that total, the forest land use comprising the subbasins identified above equals 7,699 acres. Fifty-three percent of the total forest land use is therefore comprised of

subbasins with 95% or greater forest land use. Using GIS technology, staff overlaid a road layer on the subbasin layer to determine if the subbasins were affected by anthropogenic impacts such as roads. A qualitative analysis was performed such that if roads were found throughout the individual subbasin that subbasin was excluded from being classified as “minimally-impacted”, and the forest area of that subbasin was not included in the total area for the “minimally-impacted” area definition. Subbasins 11, 38, 56, 66, 67, 74 had roads throughout the area and were not included for further analysis. If roads were found in the lower portion of each subbasin (i.e., downstream closer to Big Bear Lake), the area above the roads was considered minimally-impacted and staff digitized a polygon of the area. If roads were in the upper portion of the subbasin, everything below the roads was considered to be impacted.

A map of the digitized areas of each subbasin is shown in Figure 1. A tabular summary of the results is shown in Table 2. From this analysis, staff determined that 2,551 acres out of the initial 7,699 acres of forest land use identified as having 95% or greater forest land use was minimally-impacted. Therefore, according to the analysis performed by staff, 18% of the total forest area (i.e., 14,463 acres) is minimally-impacted, and conversely 82% of the forest land in Big Bear Lake watershed has anthropogenic impacts.

Staff would like to emphasize that this analysis is preliminary and certainly needs to be refined with additional information on other anthropogenic activities that may be occurring on forest lands, as well as information concerning the exact nature of anthropogenic activities that may be creating nutrient loads. It is also important to point out that this analysis does not affect the proposed nutrient TMDLs, which are for dry season conditions only. **No reductions from forest lands are proposed as part of this dry season TMDL.** We believe that this type of analysis, as well as development of a natural background definition, is most pertinent to the future development of wet and/or average hydrological conditions TMDLs.



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Map prepared: November 2005, CA Regional Water Quality Control Board, Santa Ana Region

**Table 1. Acres of land use for each subbasin**

Subbasin No.	Acres of land use				% of total		
	Forest	Resort	Urban	Total	Forest	Resort	Urban
1	389.9	0	54.9	444.8	87.7%	0.0%	12.3%
2	475.7	0	79	554.7	85.8%	0.0%	14.2%
3	1086.3	0	0	1086.3	100.0%	0.0%	0.0%
4	812	0	55.7	867.7	93.6%	0.0%	6.4%
5	452.8	0	63.2	516	87.8%	0.0%	12.2%
6	432.6	0	0	432.6	100.0%	0.0%	0.0%
7	386.7	48		434.7	89.0%	11.0%	0.0%
8	0	0	43.8	43.8	0.0%	0.0%	100.0%
9	405.4	0	107.1	512.5	79.1%	0.0%	20.9%
10	206.4	0	49.7	256.1	80.6%	0.0%	19.4%
11	325.9	0	7.3	333.2	97.8%	0.0%	2.2%
12	280.9	0	11.1	292	96.2%	0.0%	3.8%
13	98.5	0	22.2	120.7	81.6%	0.0%	18.4%
14	400.2	0	5.4	405.6	98.7%	0.0%	1.3%
15	310.3	0	0.8	311.1	99.7%	0.0%	0.3%
16	140.1	0	19.4	159.5	87.8%	0.0%	12.2%
17	278.1	0	30.9	309	90.0%	0.0%	10.0%
18	161.2	0	34.9	196.1	82.2%	0.0%	17.8%
19	315.8	0	48.2	364	86.8%	0.0%	13.2%
20	274.6	0	77.5	352.1	78.0%	0.0%	22.0%
21	227.7	0	150.4	378.1	60.2%	0.0%	39.8%
22	0	0	53.2	53.2	0.0%	0.0%	100.0%
23	0	0	12.4	12.4	0.0%	0.0%	100.0%
24	133.2	0	110	243.2	54.8%	0.0%	45.2%
25	59	0	111.7	170.7	34.6%	0.0%	65.4%
26	87.4	0	170.5	257.9	33.9%	0.0%	66.1%
27	0	0	108.1	108.1	0.0%	0.0%	100.0%
28	0	0	138	138	0.0%	0.0%	100.0%
29	0	0	207.9	207.9	0.0%	0.0%	100.0%
30	0	0	25.7	25.7	0.0%	0.0%	100.0%
31	502.4	0	6.5	508.9	98.7%	0.0%	1.3%
32	0	0	191.4	191.4	0.0%	0.0%	100.0%
33	383.6	0.6	6.3	390.5	98.2%	0.2%	1.6%
34	0	17.2	98.1	115.3	0.0%	14.9%	85.1%
35	545.4	97.9	3	646.3	84.4%	15.1%	0.5%
36	7.9	66.8	78.4	153.1	5.2%	43.6%	51.2%
37	0	63.6	136.1	199.7	0.0%	31.8%	68.2%
38	540.8	9.8	3.6	554.2	97.6%	1.8%	0.6%
39	0.7	1.8	15.5	18	3.9%	10.0%	86.1%
40	220.7	0	0	220.7	100.0%	0.0%	0.0%
41	1	54.9	275	330.9	0.3%	16.6%	83.1%

	Acres of land use				% of total		
Subbasin No.	Forest	Resort	Urban	Total	Forest	Resort	Urban
42	233.3	111.7	0	345	67.6%	32.4%	0.0%
43	1	0	97.6	98.6	1.0%	0.0%	99.0%
44	0	0	41.6	41.6	0.0%	0.0%	100.0%
45	0	0	124.7	124.7	0.0%	0.0%	100.0%
46	0	0	149.2	149.2	0.0%	0.0%	100.0%
47	0	0	67.3	67.3	0.0%	0.0%	100.0%
48	65.3	105.4	0	170.7	38.3%	61.7%	0.0%
49	0	0.3	67.9	68.2	0.0%	0.4%	99.6%
50	0	0	110.1	110.1	0.0%	0.0%	100.0%
51	13.9	0	0	13.9	100.0%	0.0%	0.0%
52	0	0	74	74	0.0%	0.0%	100.0%
53	0	0	202.8	202.8	0.0%	0.0%	100.0%
54	137.6	56.2	0	193.8	71.0%	29.0%	0.0%
55	0	0	79.8	79.8	0.0%	0.0%	100.0%
56	102.9	0	0	102.9	100.0%	0.0%	0.0%
57	0	0	182.7	182.7	0.0%	0.0%	100.0%
58	453.2	74.4	41.9	569.5	79.6%	13.1%	7.4%
59	0	0.7	99.4	100.1	0.0%	0.7%	99.3%
60	0	0.7	91.6	92.3	0.0%	0.8%	99.2%
61	317.9	18.3	0	336.2	94.6%	5.4%	0.0%
62	0.2	18.8	43.6	62.6	0.3%	30.0%	69.6%
63	0	0	382	382	0.0%	0.0%	100.0%
64	248.1	0	0	248.1	100.0%	0.0%	0.0%
65	0.5	0	71.4	71.9	0.7%	0.0%	99.3%
66	478.5	0	0	478.5	100.0%	0.0%	0.0%
67	681.2	0	0	681.2	100.0%	0.0%	0.0%
68	92	0	0	92	100.0%	0.0%	0.0%
69	0.2	0	47.9	48.1	0.4%	0.0%	99.6%
70	221.5	0	0	221.5	100.0%	0.0%	0.0%
71	0.5	0	110.3	110.8	0.5%	0.0%	99.5%
72	52.5	0	0	52.5	100.0%	0.0%	0.0%
73	0.3	0	238.3	238.6	0.1%	0.0%	99.9%
74	526.6	0	0	526.6	100.0%	0.0%	0.0%
75	0	0	3.3	3.3	0.0%	0.0%	100.0%
76	197.2	0	0	197.2	100.0%	0.0%	0.0%
77	0	0	8.2	8.2	0.0%	0.0%	100.0%
78	0	0	68.8	68.8	0.0%	0.0%	100.0%
79	133.7	0	2.4	136.1	98.2%	0.0%	1.8%
80	0.3	0	5.1	5.4	5.6%	0.0%	94.4%
81	37.6	0	33.8	71.4	52.7%	0.0%	47.3%
82	466.7	0	4.9	471.6	99.0%	0.0%	1.0%
83	56.9	0	43.1	100	56.9%	0.0%	43.1%
<b>Total</b>	<b>14462.8</b>	<b>747.1</b>	<b>5106.6</b>	<b>20316.5</b>			



**Table 2. Minimally-impacted areas and percentages by subbasin**

Subbasin	at 95% forest	digitized polygon area (ft^2)	digitized polygon area (acres) = ft^2 *2.2957E-5	Total forest area (acres) - digitized polygon area (acres)	% of total forest area that is minimally-impacted =digitized polygon area (acres)/total forest area (acres)
1	none				
2	none				
3	see map for polygon	20698047	475	611	44%
4	none				
5	none				
6	see map for polygon	8463937	194	238	45%
7	none				
8	NA				
9	none				
10	none				
11	roads throughout polygon				
12	see map for polygon	7610539	175	106	62%
13	none				
14	see map for polygon	15406627	354	47	88%
15	see map for polygon	12570232	289	22	93%
16	none				
17	none				
18	none				
19	none				
20	none				
21	none				
22	NA				
23	NA				
24	none				
25	none				
26	none				
27	NA				
28	NA				
29	NA				
30	NA				
31	see map for polygon	9542656	219	283	44%
32	NA				
33	see map for polygon	12691305	291	92	76%
34	NA				
35	none				
36	none				
37	NA				
38	roads throughout polygon				
39	none				

Subbasin	at 95% forest	digitized polygon area (ft^2)	digitized polygon area (acres) = ft^2 *2.2957E-5	Total forest area (acres) - digitized polygon area (acres)	% of total forest area that is minimally-impacted =digitized polygon area (acres)/total forest area (acres)
40	see map for polygon	2216112	51	170	23%
41	none				
42	none				
43	none				
44	NA				
45	NA				
46	NA				
47	NA				
48	none				
49	NA				
50	NA				
51	none	298084	7	7	49%
52	NA				
53	NA				
54	none				
55	NA				
56	roads throughout polygon				
57	NA				
58	none				
59	NA				
60	NA				
61	none				
62	none				
63	NA				
64	see map for polygon	1594463	37	211	15%
65	none				
66	roads throughout polygon				
67	roads throughout polygon				
68	see map for polygon	2261110	52	40	56%
69	none				
70	see map for polygon	6596376	151	70	68%
71	none				
72	see map for polygon	661055	15	37	29%
73	none				
74	roads throughout polygon				
75	NA				
76	see map for polygon	2560437	59	138	30%
77	NA				
78	NA				
79	see map for polygon	4758898	109	24	82%
80	none				

Subbasin	at 95% forest	digitized polygon area (ft^2)	digitized polygon area (acres) = ft^2 *2.2957E-5	Total forest area (acres) - digitized polygon area (acres)	% of total forest area that is minimally- impacted =digitized polygon area (acres)/total forest area (acres)
81	none				
82	see map for polygon	3193150	73	393	16%
83	none				
<p>Total forest area minimally-impacted areas (acres) 2,551</p> <p>Total forest area (acres) 14,463</p> <p>% of minimally-impacted areas to entire forest area after taking roads into consideration 18</p> <p>NA = no forest land use; land use was comprised of either urban or resort or both</p>					

## **CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) REQUIREMENTS**

The basin planning process has been certified by the Secretary of Resources as functionally equivalent to the requirement for the preparation of an Environmental Impact Report or Negative Declaration. The Regional Board is required to complete an environmental assessment of any changes the Board proposes to make to the Basin Plan. Staff prepared an Environmental Checklist (Attachment B to the June 2005 TMDL Report), determining that there would be no significant adverse environmental impacts from the proposed Basin Plan Amendment.

Comments on the CEQA analysis were received indicating that specific projects to implement the proposed TMDLs (e.g., alum treatment or dredging) could have environmental impacts and that those impacts should be identified in the CEQA analysis for the TMDLs. Staff has reviewed the environmental checklist in light of these comments and the proposed changes to the Basin Plan amendment/TMDLs discussed above. The checklist has been modified to recognize that there may be certain adverse environmental impacts resulting from the implementation of TMDL projects. These impacts are identified as less than significant or less than significant with the implementation of appropriate mitigation measures. The determination has been revised to indicate that the proposed project (implementation of the TMDLs) may have a significant effect on the environment but that there are mitigation measures available that will substantially lessen any adverse impact. Each of these TMDL implementation projects will be subject to separate, detailed CEQA review. The adoption of the TMDLs per se will not have a direct impact on the environment.

### **RECOMMENDATION:**

Adopt Resolution No. R8-2006-0023, amending Chapter 5 of the Basin Plan to incorporate the Dry Season Nutrient TMDLs for Big Bear Lake shown in the Attachment to the Resolution.

### **ATTACHMENTS**

- Attachment A – Tentative Resolution No. R8-2006-0023, with attached proposed (revised) Basin Plan amendment
- Attachment B – Responses to comments received from the scientific peer reviewer and from the public
- Attachment C – Environmental Checklist
- Attachment D – Comment Letters